

ANNUAL REPORT 1965

TILLSONBURG

water pollution control plant

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AUG 9 - 1966

ONTARIO WATER
RESOURCES COMMISSION

DIVISION OF PLANT OPERATIONS

Ontario Water Resources Commission

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ONTARIO WATER RESOURCES COMMISSION
OFFICE OF THE GENERAL MANAGER

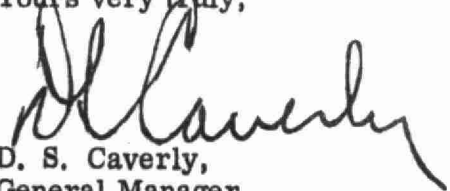
Members of the Tillsonburg Local Advisory Committee,
Town of Tillsonburg.

Gentlemen:

I am pleased to provide you with the 1965 Annual Report for the Water
Pollution Control Plant, OWRC Project No. 58-S-12.

We appreciate the co-operation you have extended to our Operations staff
throughout the year, and trust that continuation of this close association
will ensure even greater progress in the sphere of water pollution control.

Yours very truly,



D. S. Caverly,
General Manager.



ONTARIO WATER RESOURCES COMMISSION

801 BAY STREET
TORONTO 5

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J. H. H. ROOT, M.P.P.
VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER

W. S. MACDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am pleased to provide you with the 1965 Annual Report on the operation of the Tillsonburg Water Pollution Control Plant, OWRC Project No. 58-S-12.

The report presents design data, outlines operating problems encountered during the year and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

A handwritten signature in dark ink, appearing to read "B. C. Palmer".

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

This report provides useful information on the operating efficiency of this project during 1965. It is intended to act as a guide in gauging plant performance. To implement that aim, it includes detailed statistical and cost data, a description of the project and a summary of its operation during the year.

Of particular interest will be the cost data, which show the total cost to the municipality and the areas of major expenditure.

The Regional Operations Engineer is primarily responsible for the preparation of the report, and has compiled and arranged the material. He will be pleased to answer any questions regarding it. Other groups, however, were involved in the production, and these include the statistics section, the Drafting Section of the Division of Sanitary Engineering and the Division of Finance.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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TILLSONBURG
water pollution control plant

operated for

THE TOWN OF TILLSONBURG

by the

ONTARIO WATER RESOURCES COMMISSION

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DIRECTOR: B. C. Palmer

Assistant Director: C. W. Perry
Regional Supervisor: A. C. Beattie
Operations Engineer: P. J. Osmond

801 Bay Street Toronto 5.

'65 REVIEW

This report gives in detail significant data on the operation of the various treatment units at the Tillsonburg Water Pollution Control Plant during 1965.

The average flow treated at the plant during the year was 612,000 gallons per day which was 92% of the design capacity of the plant. This represents a 19.6% increase in flow over 1964. During the peak month of December the average daily flow was 106% of the design capacity. An expansion of the treatment facilities at the plant is necessary.

A raw sewage having an average strength of 191 ppm BOD and 242 ppm SS was treated. Good removals were obtained by the plant resulting in a 95.0% reduction in BOD and a 93.5% reduction in SS. A total of 203.4 tons of BOD and 252.5 tons of SS was removed. A total of 663,090 cu. ft. of raw sludge was treated by the digester and 110,780 cu. ft. of digested sludge was hauled by truck. Proper chlorination of the final effluent was maintained from May to October.

Inspections of the structures and grounds showed that they were well maintained and in good condition. An electrical and mechanical inspection was made of the project equipment and no major deficiencies were discovered. A total of 163 1/2 hours was spent by the OWRC head office technicians at the project.

The operating cost for the year was \$25,142.33, an increase of approximately \$3,300 over the cost in 1964. The cost of treatment was increased due to the increased flows. The cost per million gallons treated was \$112.49 as compared to \$116.50 in 1964.

GLOSSARY

BTU	British Thermal Unit
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpm	gallons per minute
lin. ft.	linear feet
mgd	million gallons per day
pH	a symbol for hydrogen-ion concentration; a pH test determines the intensity of the acidity or alkalinity of a water
ppm	parts per million
ss	suspended solids
SWD	side wall depth
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)
turbidity	a measurement of the amount of visible material in suspension in water

HISTORY

1958 - 1965

INCEPTION

The Town of Tillsonburg approached the Ontario Water Resources Commission to undertake the financing, construction and operation of a new water pollution control plant.

The firm of R. V. Anderson and Associates, Toronto Ontario, Consulting Engineers, was engaged to prepare plans and specifications for the project.

CONSTRUCTION

Construction began in December 1958. Schwenger Construction Company Limited, Burlington, constructed the plant and pumping station with associated equipment and appurtenances. W. A. Haggerty Construction Limited constructed the forcemain and sanitary sewers. In February 1961 the Division of Plant Operations of the Commission took over the operation of this new project.

TOTAL COST

The total cost of the project was \$608,020.09

Project Staff

Chief Operator - J. H. Allin

Operator - W. D. Ronson

COMMENTS

The Tillsonburg Water Pollution Control Plant has a staff of two, a Chief Operator and an operator. An 8 hour per day supervision is given during the week and a partial coverage is given both on Saturday and Sunday.

Mr. Allin attended a Chief Operators' Conference in April 1965 and Mr. Ronson received certification as a Maintenance Gas Fitter after completion of a 3 day course in the fall of 1965. Mr. Allin was already licenced as a Gas Fitter.

Description of Project

INFLUENT WORKS

The plant flow enters an influent chamber via a 12 inch diameter forcemain from the John Pound Street Pumping Station and a 15 inch diameter gravity sewer. The influent chamber is equipped with an adjustable bypass weir.

From the influent chamber the flow passes through a barminutor which continuously screens and cuts the coarse material in the sewage without removing it from the flow. A bypass screen is also provided in case the barminutor breaks down.

The flow then passes through an Aer-degritter which removes the sand and grit and allows the organic material to remain in suspension.

PRIMARY SEDIMENTATION

Two rectangular settling tanks receive the sewage from the grit removal unit. Approximately 50% of the suspended solids in the incoming sewage settles to the bottom of the tanks.

A set of flight collectors moves the sludge on the bottom to one end of the tank where it is drawn off into a hopper. The flights also skim the surface and remove floating material which is also put into the hopper. The contents of the hopper are then pumped into the digester and the settled sewage flows over the weirs to the aeration tanks.

AERATION SECTION

The effluent from the primary tanks flows

into two single pass aeration tanks where it is mixed with the activated sludge returned from the final settling tanks. The mixture is aerated for a period of 10.1 hours at design flow. The two tanks allow for some flexibility in the method of their operation. The air is supplied by two blowers located in the control building to the headers located at the bottom of the tank. The headers are equipped with Sparjer air diffusers.

FINAL SEDIMENTATION

The aerated mixed liquor from the aeration tanks is retained in two rectangular tanks for a period of 2.8 hours at design flow. This allows the activated sludge to settle and it is collected and returned to the aeration section or wasted. (Excess activated sludge is returned or "wasted" to the primary tanks where it settles and is pumped to the digester). The remaining liquid flows over the weirs of the final tanks, is chlorinated in the chlorine contact chamber, and then flows to the creek.

SLUDGE DIGESTION

The Tillsonburg plant utilizes a single stage digester. The tank is 45 feet in diameter and has a floating cover. The sludge from the digester is pumped through a heat exchanger and recirculated back to the digester in order to maintain a temperature of approximately 90°F, where in the absence of air the decomposing or digestion process takes place. The sludge is broken down by bacterial action to a thick, black, odorless liquid. Digested sludge is hauled away from the digester by tank truck.

PROJECT COSTS

NET CAPITAL COST (Estimated) (Long Term Debt to OWRC)	<u>\$608,020.09</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1965	<u>\$ 54,490.29</u>
Net Operating	25,142.33
Debt Retirement	12,270.00
Reserve	3,455.22
Interest Charges	34,069.34
TOTAL	<u>\$ 74,936.89</u>

RESERVE ACCOUNT

Balance at January 1, 1965	\$ 16,909.28
Deposited by Municipality	3,455.22
Interest Earned	1,009.55
Less Expenditures	-
Balance at December 31, 1965	<u>\$ 21,374.05</u>

MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER
JAN	1177.12	657.32					52.20		50.04	417.56	
FEB	2198.20	657.32		124.70	328.26		72.04		97.98	910.20	7.70
MARCH	1339.38	816.33			375.16		(6.14)	1.85	134.13	10.35	7.70
APRIL	1811.26	792.93		237.25	332.36		58.21		54.64	327.67	7.70
MAY	1751.82	1071.18			349.77		96.16	129.66	5.05	90.30	7.70
JUNE	2655.66	714.12		134.71	386.95	224.03	119.79	40.00	512.17	514.71	9.18
JULY	1833.46	751.96			429.12		33.02	472.34	40.60	82.65	23.77
AUG	2221.51	746.56			431.99	224.03	100.42	10.66	132.59	551.79	23.47
SEPT	2332.63	753.17			400.06		49.16	171.76	320.16	630.62	7.70
OCT	2698.28	1119.84			407.25	224.03	136.21	1.13	152.14	649.98	7.70
NOV	2046.19	803.36			343.06		153.93		738.14		7.70
DEC	3076.82	774.96		116.73	749.23		325.79		127.91	966.80	15.40
TOTAL	25142.33	9659.05		613.39	4533.71	672.09	1192.79	827.40	2365.55	5152.63	125.72

* SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE \$4,087.79

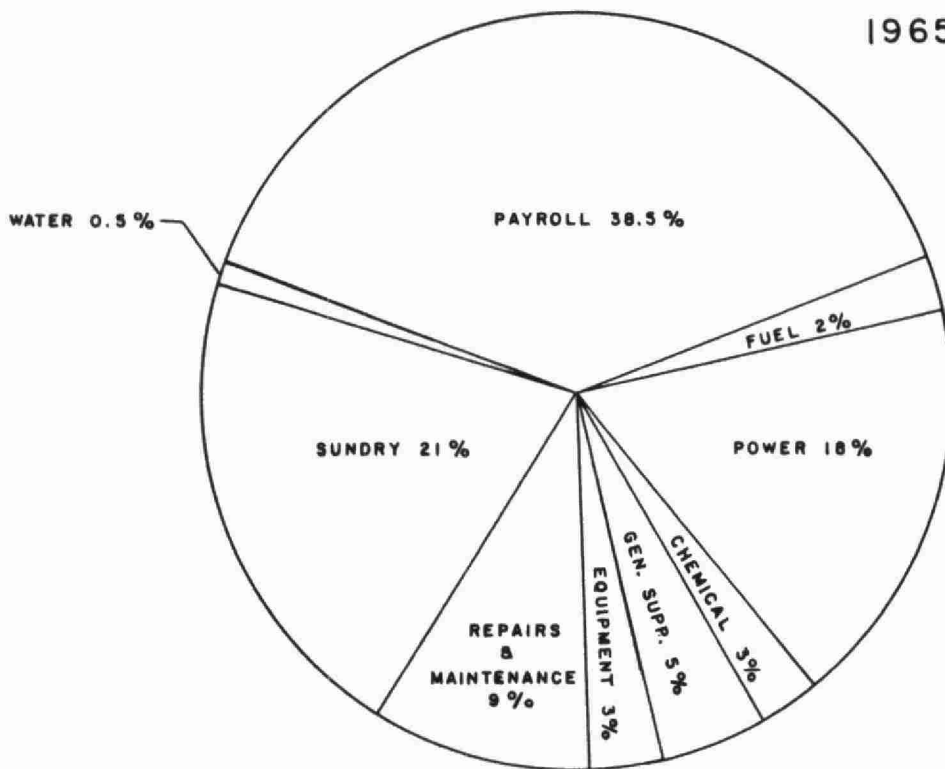
BRACKETS INDICATE CREDIT

YEARLY OPERATING COSTS

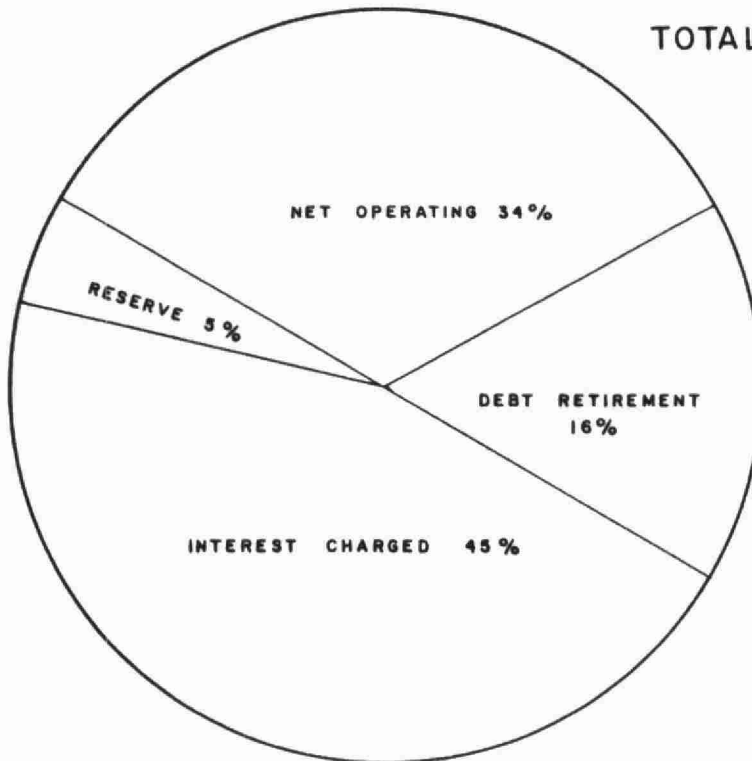
YEAR	M.G. TREATED	TOTAL COST	COST PER FAMILY PER YEAR	COST PER MILLION GALLONS	COST PER L.B. OF BOD REMOVED
1963	173,024	\$19,753.04	* \$11.66	\$114.20	5 CENTS
1964	187,461	\$21,844.08	\$11.35	\$116.50	6 CENTS
1965	223,489	\$25,142.33	\$14.43	\$112.49	6 CENTS

* BASED ON ANNUAL POPULATION ESTIMATE AND 3.9 PERSONS PER FAMILY

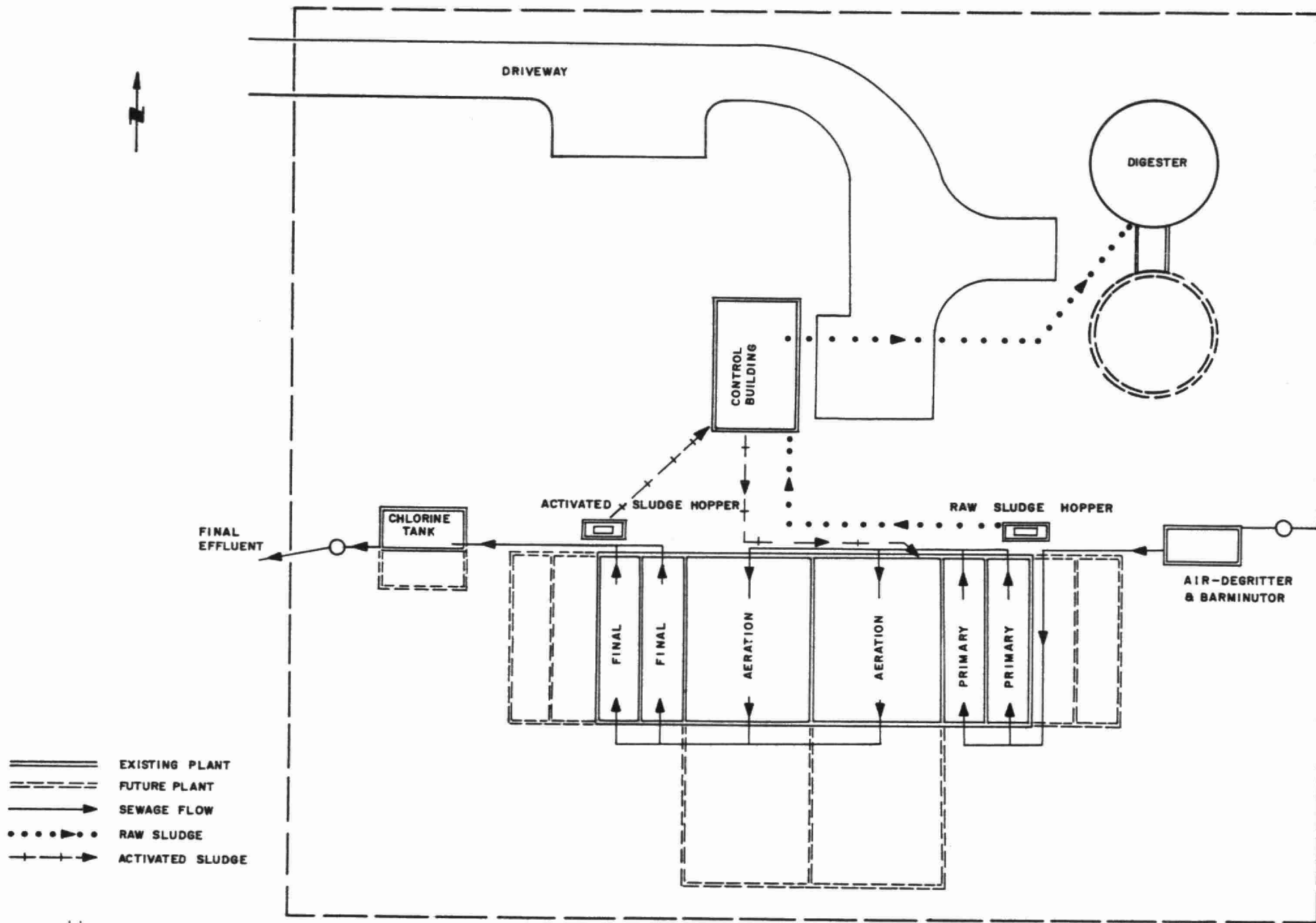
1965 OPERATING COSTS



TOTAL ANNUAL COST



**Technical
Section**



TILLSONBURG S.T.P.

Design-Data

JOHN POUND STREET PUMPING STATION

No. 1 - Chicago Pump Company - capacity 458 gpm @ 26.5 TDH 7 1/2 HP motor.

No. 2 - Chicago Pump Company - capacity 687 gpm @ 29.5 TDH 10 HP motor.

No. 3 - Chicago Pump Company - capacity 917 gpm @ 33.5 TDH 15 HP motor.

COMMINUTION

One 18" Chicago Pump Barminutor Type "B". Also a bypass channel with bar screen.

TREATMENT PLANT

Type of Plant - Activated sludge.

Design Population - 7,000 persons.

Design Plant Flow - 665,000 gallons per day.

Per Capita Flow - 95 gallons.

Five Day BOD -

Raw Sewage - 235 PPM

Removal - 95%

Suspended Solids -

Raw Sewage - 250 PPM

Removal - 95%

PRIMARY TREATMENT

Influent Sewer

12" forcemain from John Pound Street Pumping Station.

15" gravity sewer from the east side of town.

Comminution

One 18" Chicago Pump Barminutor - Type "C".

Also a bypass channel with bar screen.

Grit Removal

Chicago Pump Aer-degritter with dimensions of 13 ft. by 6 ft. by 8 ft. The volume is 3,900 gallons and at design flow has a detention period of 8.4 minutes.

The unit has a maximum capacity of 4.0 MGD.

The cross velocities at the bottom of the tank are approximately 2.0 feet per second.

PRIMARY SEDIMENTATION

Two rectangular units.

Each tank is 50 ft. 4 in by 10 ft. by 8 ft. for a combined volume of 50,300 gallons giving a detention time of 1.82 hours at design flow. The sludge is collected by Jeffrey flight collectors.

Raw Sludge pumps

One Chicago Pump, Scrub-Flow pump with

a capacity of 125 gpm @ 90 ft. TDH with a 7 1/2 HP motor.

One standby sludge pump, Wemco, Torque-flow with a capacity of 125 gpm @ 65 ft. TDH with a 10 HP motor.

SECONDARY TREATMENT

Aeration Tanks

Two single pass rectangular aeration tanks each 50 ft. by 30 ft. by 13 ft. for a combined volume of 281,000 gallons. Detention time of 10.1 hours at design flow.

Air Supply

Two 24 ft. headers in each tank. Fourteen Walker Process Diffuser Sparjers per header for a total of twenty-eight sparjers per tank. Two Roots-Connersville 816 Blowers, each having a capacity of 875 cfm @ 7.5 psig. Each blower is driven by a 40 HP motor.

FINAL SEDIMENTATION

Two rectangular units each 50 ft. 4 in. by 10 ft. by 12 ft. 3 in. having a combined volume of 77,000 gallons giving a detention period of 2.8 hours at design flow. The sludge is collected by Jeffrey Flight collectors.

Return Sludge Pumps

Two Smart-Turner centrifugal pumps, each having a capacity of 250 gpm @ 25 TDH. Each pump is driven by a 3 HP U.S. Vari-Drive motor.

DIGESTER

One circular tank 45 ft. diameter by 22 ft. 4 in. SWD with a Chicago Pump Company Pontoon type floating cover. (Maximum liquid height 20 ft. 1 in. at side wall and 26 ft. 7 in. at centre). Volume of digester is 36,000 cu. ft.

Heat Exchanger

One Pacific Flush Tank Company heat exchanger operating on sewage gas or fuel oil to heat the sludge. Rated capacity is 375,000 BTU/hour.

CHLORINATION

Chlorine contact chamber 20 ft. by 11 ft. 3 in. by 9 ft. 9 in. having a volume of 13,950 gallons, giving a contact period of 30.2 minutes at design flow. One Wallace and Tiernan, Series A-731, V-Notch chlorinator with a capacity of 400 lbs/day.

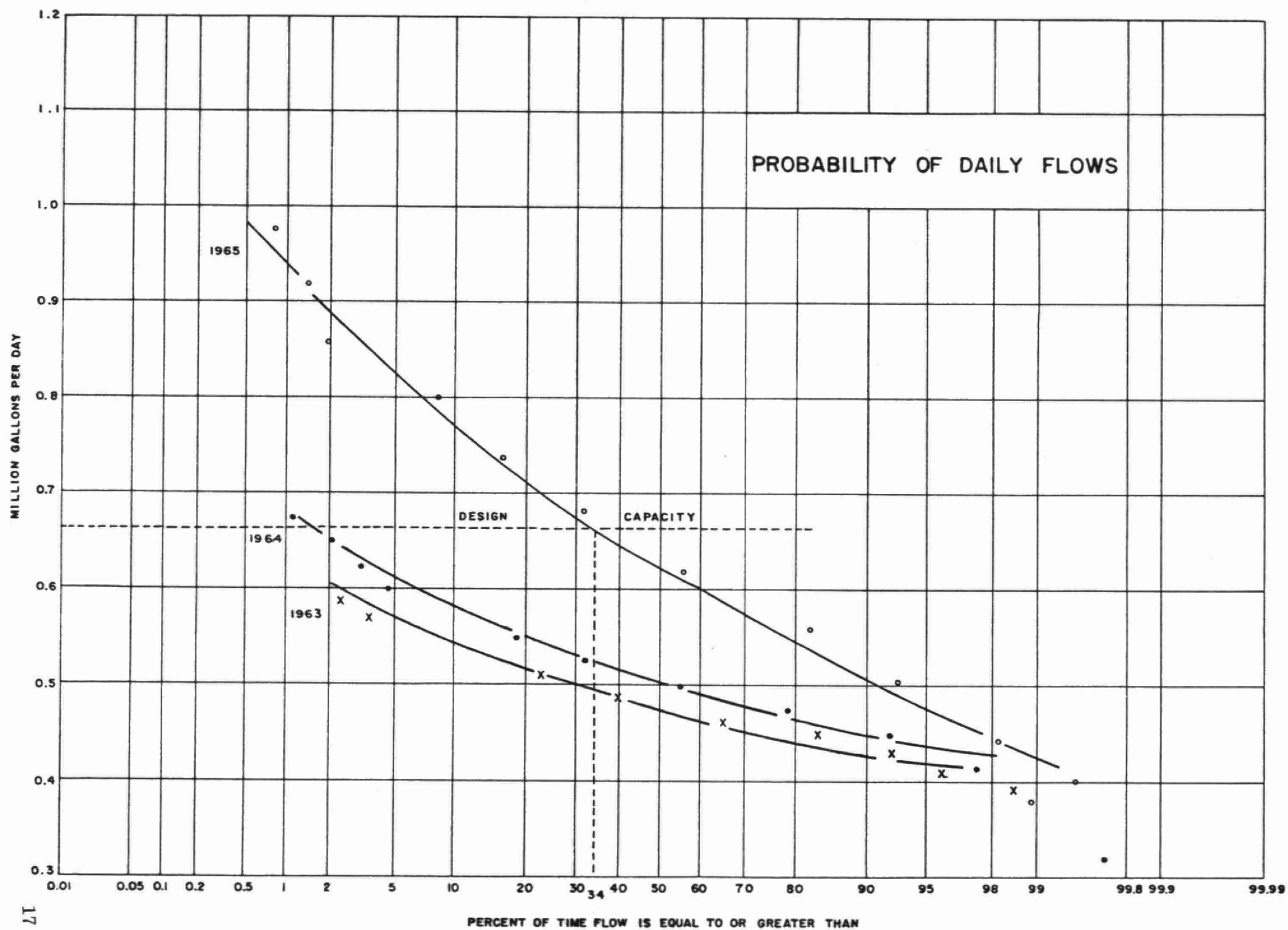
Flow Measurement

The flow is measured by a Foxboro flow meter, which records, indicates and integrates the flow passing through a 9 in. Parshall flume. It also provides automatic control of the chlorinator.

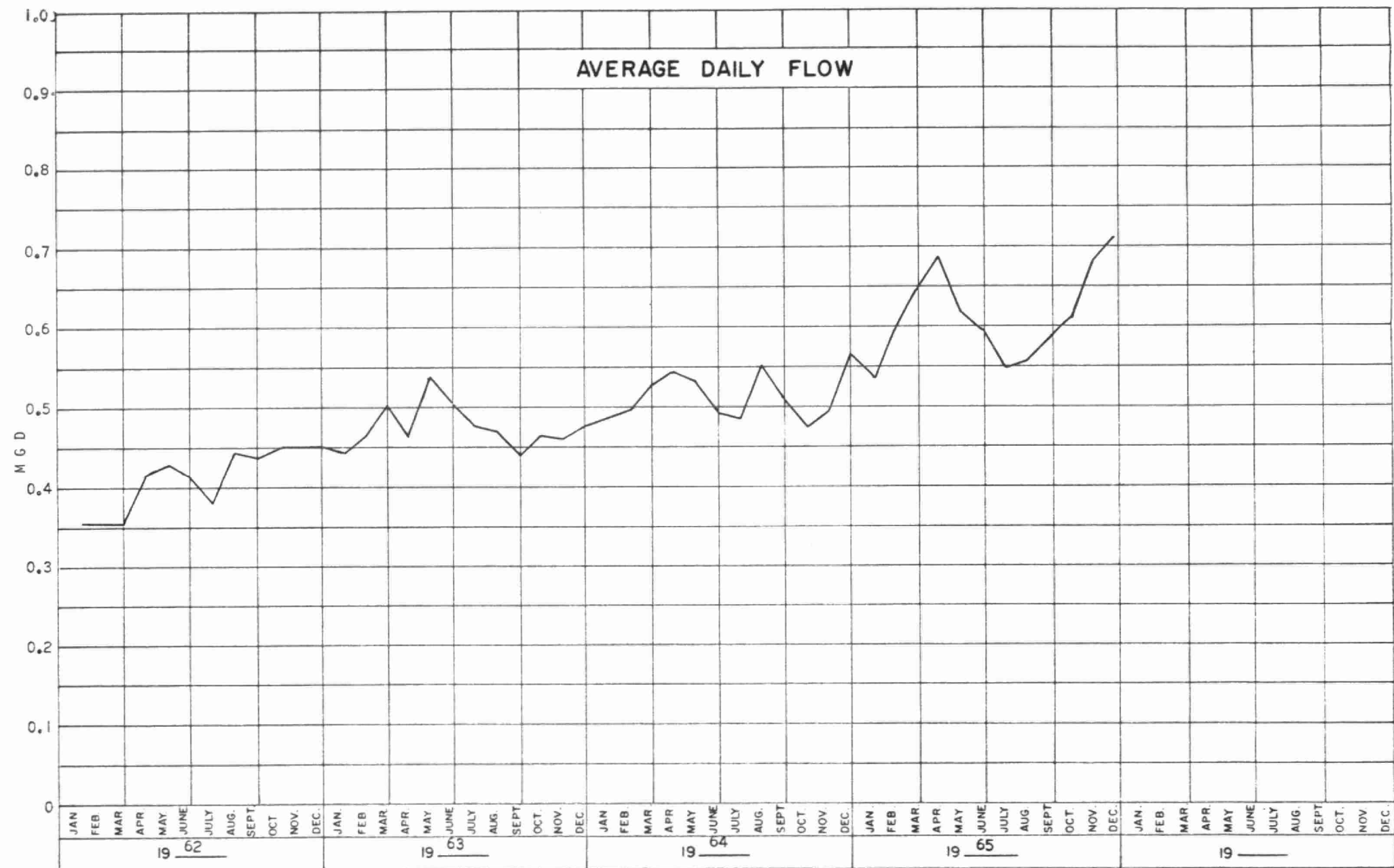
Process Data

A total of 223.489 million gallons of sewage was treated at the plant in 1965 as compared to 187.461 million gallons in 1964. The average daily flow was 612,000 gallons and represents 92% of the design capacity of the plant. This is an increase of 19.6%. The maximum average daily flow for a month occurred in December, when the flow was 704,000 gallons per day which represents 106% of the design capacity.

From the probability graph it can be seen that during 1965 the design capacity of the plant was exceeded 34 percent of the time.



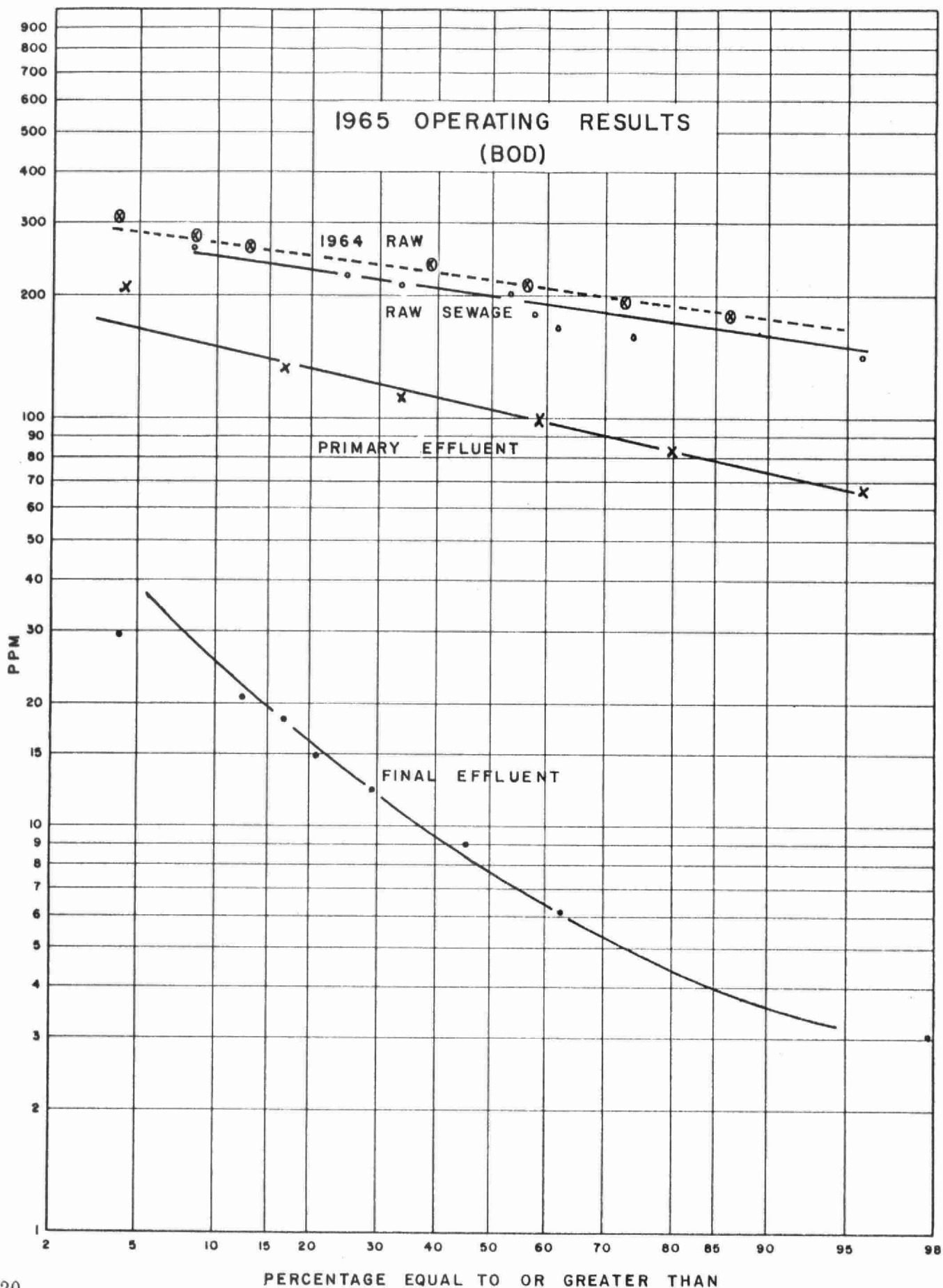
AVERAGE DAILY FLOW

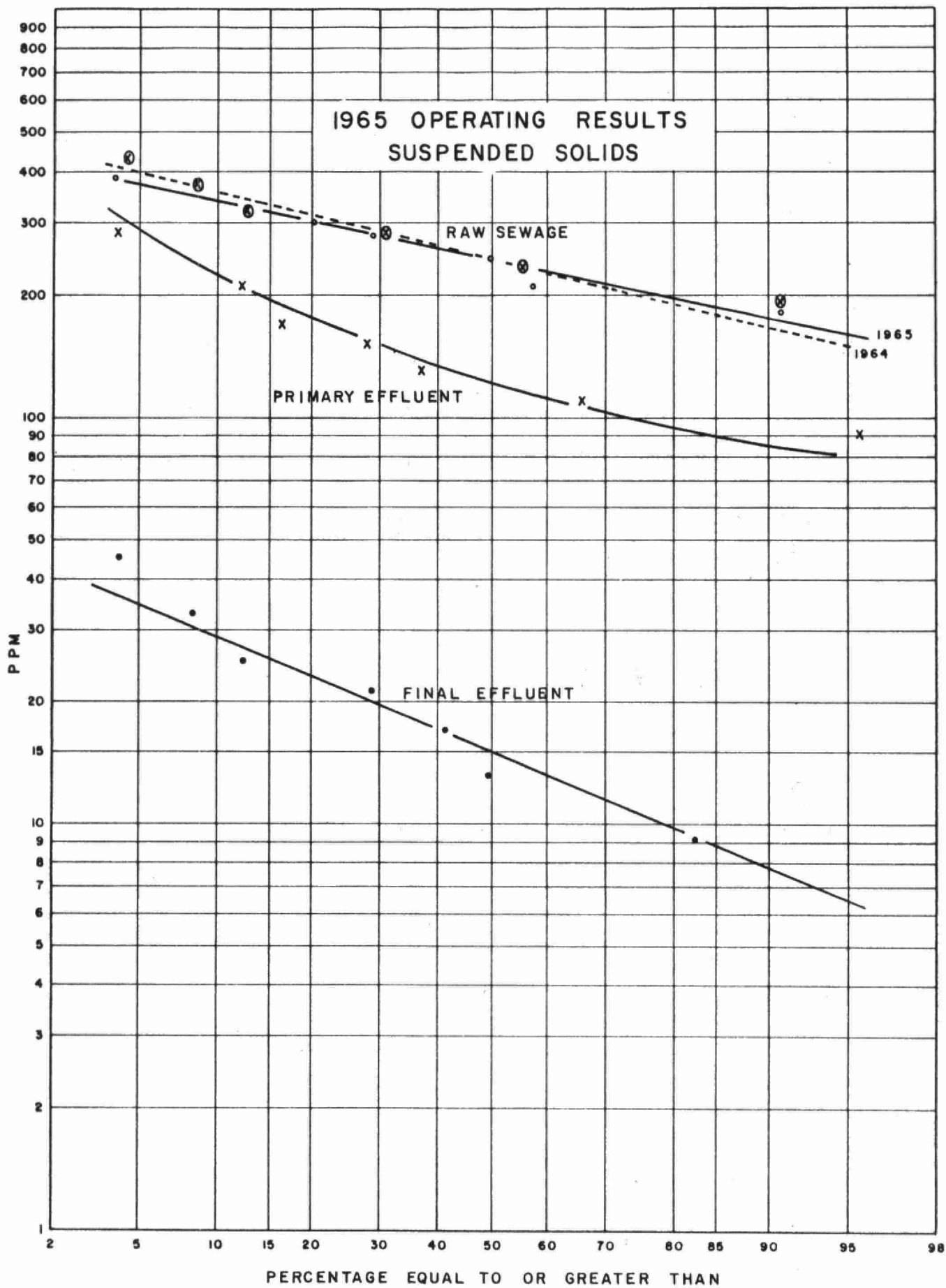


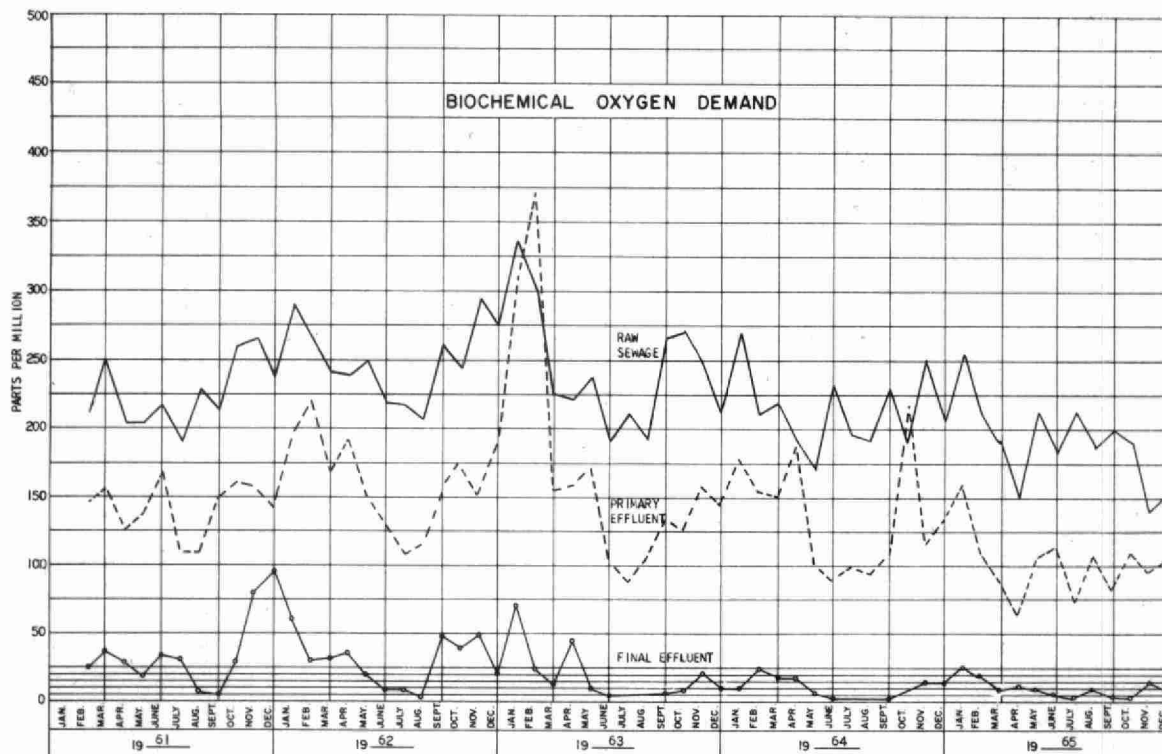
FLOW DATA

Month	Plant Flow (MG)	Average Daily Flow (MGD)	Maximum Daily Flow (MGD)
January	16.512	.534	.859
February	16.732	.599	1.000
March	19.886	.640	1.206
April	20.648	.690	.999
May	19.050	.615	.718
June	17.836	.595	.639
July	16.913	.546	.610
August	17.137	.553	.687
September	17.624	.589	.637
October	18.892	.609	.829
November	20.421	.682	.784
December	21.838	.704	.887
Total	223.489		
Average	18.624	.512	

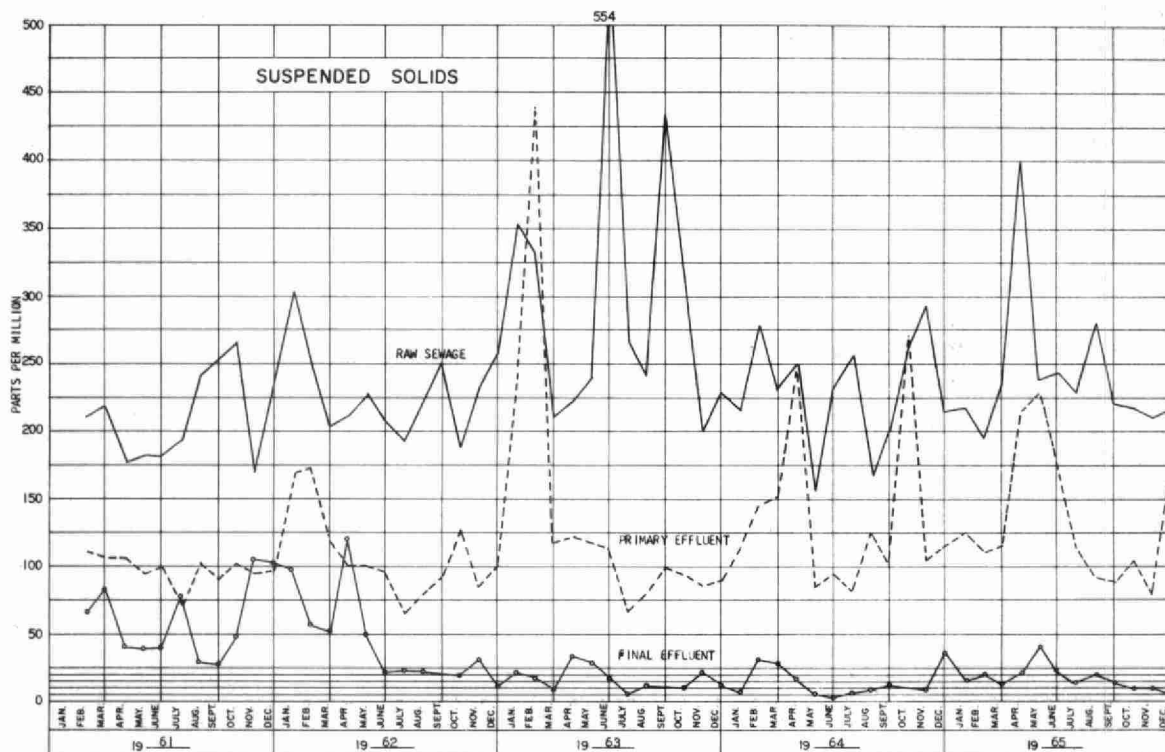
During the months of April, November and December the average daily flows exceeded the design capacity of the plant.







MONTHLY VARIATIONS



GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	
JAN.	255	24	90.5	19.1	218	15	93.0	16.2	29
FEB.	212	17	92.0	16.3	195	17	91.0	14.9	24
MAR.	192	8.2	95.5	18.3	232	11	95.0	22.0	59
APR.	150	10	93.5	14.4	402	20	95.0	39.4	38
MAY	212	8	96.0	19.4	239	40	83.0	19.0	33
JUNE	182	3	98.5	16.0	244	20	92.0	20.0	24
JULY	215	2	99.0	18.0	229	12	94.5	18.4	23
AUG.	187	8	95.5	15.3	280	18	93.5	22.4	22
SEPT.	200	4	98.0	17.3	221	12	94.5	18.4	25
OCT.	191	2.2	99.0	17.8	218	8	96.5	19.8	28
NOV.	141	12	91.5	13.2	210	9	95.5	20.5	23
DEC.	154	8.4	94.5	15.9	216	4	98.0	23.1	35
TOTAL	-	-	-	203.4	-	-	-	252.5	363
AVG.	191	9	95.0	17.0	242	16	93.5	21.0	30

COMMENTS

A raw sewage having an average strength of 191 ppm in BOD and 242 ppm in SS was treated in 1965. The final effluent had an average strength of 9 ppm in BOD and 16 ppm in SS representing reductions of 95.0% and 93.5% respectively. The final effluent met the O W R C objective of 15 ppm for BOD 96% of the time and the standard of 15 ppm for SS 50% of the time. A total of 203.4 tons of BOD and 252.5 tons of SS was removed during the year.

The primary effluent had an average strength of 102 ppm BOD and 122 ppm SS, representing removals of 43.4% and 49.6% respectively.

The above results are based on 8 hour composite samples taken every two weeks.

A total of 363 cu. ft. of grit was removed at an average of 30 cu. ft. per month. This represents a grit removal of 1.6 cu. ft. per million gallons of raw sewage.

AERATION SECTION

MONTH	PRIM. EFFL. BOD. PPM.	MLSS. PPM.	LBS. BOD. PER 100 LBS. M. L. S. S.	CUBIC FEET AIR PER LB. BOD. REMOVED
JANUARY	160	1695	18	2282
FEBRUARY	119	1441	18	2490
MARCH	87	1880	12	2250
APRIL	64	2220	7	3462
MAY	107	2208	10	2863
JUNE	114	2195	11	3355
JULY	73	1763	8	5656
AUGUST	109	1857	12	3907
SEPTEMBER	83	2256	8	3259
OCTOBER	110	2231	10	2356
NOVEMBER	96	2227	10	2773
DECEMBER	104	2038	13	2286
TOTAL	-	-	-	-
AVERAGE	102	2001	11	3078

COMMENTS

The average BOD of the primary effluent to the aeration section was 102 ppm and the average mlss was 2001 ppm resulting in an average loading of 11 pounds of BOD per 100 lbs. mlss. An average of 3078 cu. ft. of air was supplied per pound of BOD removed. Again during the summer a greater quantity of air was used per pound of BOD removed. This was due to the continuous operation of two blowers in order to maintain a proper dissolved oxygen level. The final effluent BOD during this time ranged from 2.0 to 8.0 ppm.

DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			SLUDGE FROM DIGESTERS			GAS PRODUCED 1000'S Cu. Ft.
	1000'S CU. FT.	% SOLIDS	% VOL. MAT.	1000'S CU. FT.	% SOLIDS	% VOL. MAT.	
JAN.	80.05	-	-	10.14	2.20	-	-
FEB.	79.45	-	-	10.55	-	-	-
MAR.	52.54	-	-	3.76	-	-	-
APR.	29.20	-	-	-	3.42	-	-
MAY	45.11	-	-	5.64	6.32	-	-
JUNE	49.33	4.31	-	12.82	-	-	-
JULY	53.48	3.98	-	17.51	-	-	-
AUG.	44.13	-	-	9.12	2.99	-	-
SEPT.	49.81	-	-	7.72	2.72	-	-
OCT.	57.69	-	-	11.41	2.55	-	-
NOV.	58.95	-	-	12.28	-	-	-
DEC.	63.35	-	-	9.83	-	-	-
TOTAL	663.09	-	-	110.78	-	-	-
AVG.	55.26	4.14	-	9.23	3.37	-	-

COMMENTS

In 1965 an estimated 663,090 cu. ft. of raw sludge was pumped to the digester. A total of 110,780 cu. ft. of digested sludge at an average concentration of 3.37% was trucked away for disposal. This amounted to 17% of the raw sludge pumped to the digester or 18 cu. yd. per million gallons of raw sewage.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	16.512	-	-
FEBRUARY	16.732	-	-
MARCH	19.886	-	-
APRIL	20.648	-	-
MAY	19.050	497 *	3.67
JUNE	17.836	671	3.76
JULY	16.913	823	4.87
AUGUST	17.137	834	4.87
SEPTEMBER	17.624	709	4.02
OCTOBER	18.892	709 **	3.88
NOVEMBER	20.421	-	-
DECEMBER	21.838	-	-
TOTAL	223.489	4243	-
AVERAGE	18.624	707	4.19

* 22 days chlorination

** 30 days chlorination

COMMENTS

The final effluent was chlorinated from May 9 to October 30. A total of 4243 pounds of chlorine was used at an average dosage of 4.19 ppm. The average chlorine residual was 0.5 ppm in the final effluent prior to being discharged into Otter Creek.



CONCLUSIONS

The flow to the plant has reached the point where plant expansion must be considered. This is indicated by the average daily flow for the year being 92% of the design flow and the average daily flow for the month of December being 106% of the design flow. Excellent treatment results are being obtained as indicated by a reduction of 95% in BOD and 93.5% in suspended solids. The project was well operated and maintained.

RECOMMENDATIONS

The results of a study commenced in February 1966 by a consultant should be implemented as soon as possible. As well as expanding plant capacity, certain other features such as blower noise and storage space should be improved.

